

# Creo® Simulate

Creo Simulate gives you the power to evaluate structural and thermal product performance on your digital model before resorting to costly, time-consuming physical prototyping. When you have early insight into product behavior, you can greatly improve product quality while saving time, effort and money.

It is available as a standalone application or as an extension of Creo Parametric.

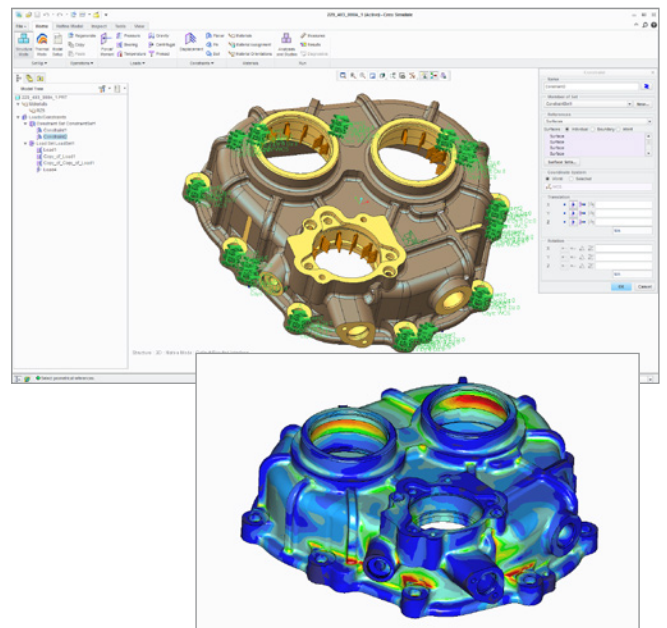
## Features and Specifications

### Analysis Capabilities

- Linear Static Structural Analysis
- Static Structural Analysis with Small Displacement Contact
- Modal Structural Analysis
- Linear Buckling Structural Analysis
- Linear Steady State Thermal Analysis
- FEM mode: Use of NASTRAN solver
  - Linear Static Structural Analysis
  - Modal Structural Analysis
- FEM mode: Use of ANSYS solver
  - Linear Static Structural Analysis
  - Modal Structural Analysis
  - Linear Steady State Thermal Analysis
- Fatigue (optional module)

### Convergence

- P-type Finite Element methodology
- Single Pass Adaptive
- Multi-Pass Adaptive
- User control on convergence criteria
- Automatic sizing and special treatment of elements near singularities



You can analyze your model and quickly identify problem areas. Once you update the design, you can easily rerun the analysis, without recreating it.

## Design Studies

- Parameters as independent variables of the Design Study
  - Load and Constraint values
  - Material, beam, spring, mass, shell properties
  - CAD model parameters
  - CAD model dimensions
  - General parameters through user defined relations
- Creo Simulate Measures as dependent variables of the design study
- Local Sensitivity
- Global Sensitivity
- Optimization

## General Modeling Tools

- Units Manager
  - Commonly used units for all quantities available
  - Creation of custom units and unit systems
  - Model definition in user selected units
  - Results in user selected units
- Material Library
  - Typical metals and plastics included
  - Storage of user defined materials
  - Departmental or company material libraries
- Coordinate Systems
  - History-based, associative, parametric features
  - User defined Cartesian, Cylindrical or Spherical coordinate systems

- Function Manager
  - Quantity dependence on space, temperature, time, frequency, measure
  - Symbolic
  - Tabular
  - Interpolated over geometry
- Process Guide
  - Model definition by user defined HTML templates
  - UI access through hyperlinks

## Structural Boundary Conditions

- Boundary Conditions specified on geometry
- Enforced Translations and Rotations
- Mirror and Cyclic Symmetry Constraints
- Planar, Pin and Ball Constraints
- Force and Moment Loads
  - Specified in terms of total or density value
  - Uniform or spatially varying
  - Static equivalents to point loads
- Pressure Loads
- Bearing Loads
- Gravity Loads
- Centrifugal Loads specified by the angular velocity or angular acceleration of the structure
- Inertial Loads
- Loads imported from Creo Mechanism Analysis
- Temperature Loads
  - Uniform or spatially varying
  - Temperature fields calculated by a Creo Simulate Thermal Analysis
  - Imported External Temperature fields

## Thermal Boundary Conditions

- Boundary Conditions specified on geometry
  - Prescribed Temperatures
    - Uniform or spatially varying
- Convection Conditions
  - Uniform or spatially varying
  - Imported External Fields
- Cyclic Symmetry constraints
- Heat Loads
  - Specified in terms of total or density value
  - Uniform or spatially var

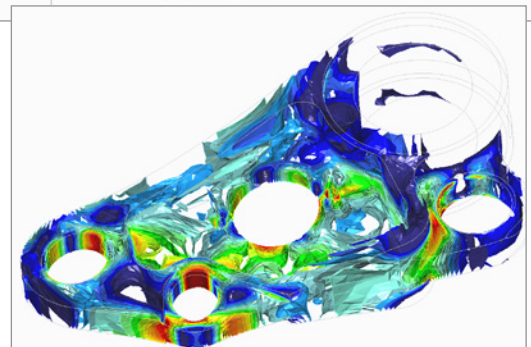
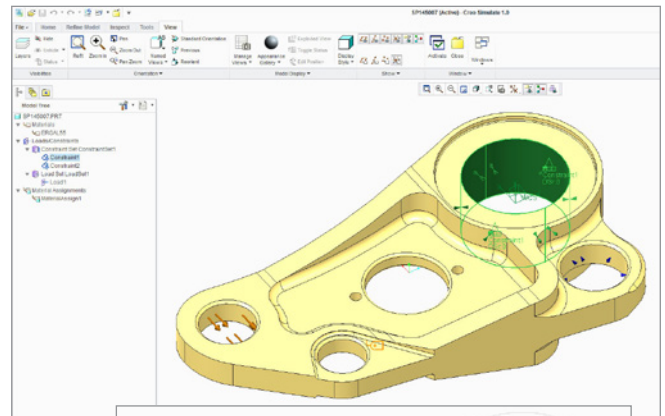
## Materials

- Isotropic Material Properties assigned to geometry
- Isotropic Material Failure Limits:
  - Supported Criteria: Modified Mohr, Maximum Shear Stress (Tresca), Distortion Energy (von Mises)
- Temperature dependent material structural properties

## Element Types and Idealizations

- Continuum elements: Bricks, Wedges, Tetrahedra
- 3D Shells: quadrilateral, triangular
- Automatic and semi-automatic Compression of solid geometry to surfaces for Shell modeling
- Curved Beams
  - Along Curve or Point-Point
  - General Beam Section editor, including parametric Sketched Sections
  - General specification of Beam Section Orientation
  - Beam Releases

- Constant Stiffness Springs
  - Point-to-Point or Point-to-Ground
  - Extensional and Rotational stiffness
- Concentrated Masses



Setting up analysis constraints is fast and easy.

## Meshing Tools

- Surface Regions
  - History-based, associative, parametric features
- Volume regions
  - History-based, associative, parametric features
  - Defined as Extrude, Revolves, Sweeps, Helical Sweeps, Blends, Rotational Blends, Swept Blends or based on Quilts
- Fully Automatic Mesh Generation
  - Controls through Maximum or Minimum Element Size, Point Density, Hard Points, Hard Curves
  - Automatic cleanup of CAD geometry defects

## Connections

- Contact Interfaces
  - Surface-Surface or Component-Component
  - Frictionless
  - Infinite Friction with Slippage Indicators
  - Press-fit
- Fasteners
  - Bolts or Screws
  - Connecting Solids or Shells
  - Preload
- End Welds
- Perimeter Welds
- Spot Welds
- Automatic import and modeling of Creo Parametric Weld Features
- Rigid Links

## Results

- Multiple Result Window display
- Saved Result Window definitions
- Result Window Templates
- Full Results post-processing
  - On full model or selected geometry
  - Fringes, Contours, Cutting / Capping Surfaces, Iso-surfaces
  - Vector Plots
  - Graphs vs. Coordinates or Along Curve
  - Measure Graphs vs. Parameter, Optimization step
  - Animation

- Results recorded as Measures
  - At Point
  - Maximum / Minimum Over Model
  - Maximum / Minimum over Selected Geometry
  - Functions of Measures
- Linearized Stress report
- HTML report
- Export Formats
  - Creo View
  - VRML
  - mpg, avi
  - Graph Tables
  - Excel

## Process Tools

- Creo Simulate Model is an integral part of CAD model and fully supported by Windchill®
- Results optionally uploaded to Windchill and automatically associated to the model
- Distributed batch processing across multiple compute servers

## Language Support

- English, German, French, Japanese, Russian, and Simplified Chinese

## Platform support and system requirements

Visit the [PTC support page](#) for platform support and system requirements.

For more information, visit: [PTC.com/product/creo](https://www.ptc.com/product/creo)

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